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TWO COLLECTIONS OF PLEISTOCENE FOSSILS FROM THE ISTHMUS OF PANAMA.

BY AMOS P. BROWN AND HENRY A. PILSBRY.

The two collections of fossils treated of in this paper were briefly alluded to in our second paper on the Gatun Formation,¹ issued in January of this year. They were collected by Professor W. B. Scott, 1911, with the assistance of Mr. D. F. Macdonald, geologist of the Isthmian Canal Commission. As noted in our former paper, they came from two localities near the north end of the canal.

Collection 1.—*From the oyster-shell bearing layers in the Black Swamp near Mount Hope (Monkey Hill).*—The top of these beds is some four feet above the present sea level and they are encountered in digging for sewers in the town of Colon. They are also known from Toro Point, across the bay from Colon. The material consists largely of coral mud, with corals and coralline fragments and many molluscan remains mixed with more or less silt containing vegetable matter. It was evidently shipped to us just as it came from the excavations, and contained the small species as they were imbedded in the mud of the sea bottom. No volcanic ash was detected in this material. While the species represented are almost all recent, some of them may be extinct, and at any rate have not yet been found in the living state.

In a paper published in 1912, Dr. Dall² has described four of these found in our material. Besides these four described by Dall, we now add three additional new species; and a number of others were among the specimens in the collection, but not in sufficiently good form for description. We have found some of these described new species in collections of recent shells in the A. N. S. P. collection, and it may be that none of these new species will be found to be really extinct when the molluscan fauna of that part of the Caribbean is fully known. The fauna of these beds (which Professor Scott has named the Mount Hope Formation) numbers in this collection 69 named species of Gastropods, with 3 additional species named only as to genus; 45 named species of Pelecypods, with 3 additional species named as to genus; 2 Scaphopods; 6 species of corals and one barnacle.

¹ Fauna of the Gatun Formation, Isthmus of Panama, II. *Proc. A. N. S. P.*, 1912, pp. 500–519.

² New Species of Fossil Shells from Panama and Costa Rica, by W. H. Dall, *Smithsonian Misc. Coll.*, vol. 59, No. 2, 1912.

Collection 2. From the oyster-shell areas in the black, unconsolidated mud, uncomfortable on the Gatun Formation at the lower (north) end of the Gatun Locks.—This deposit of mud extends from a few feet below sea level to about 10 feet above it at this point. The black character of the deposit and the finding of definite vegetable remains in it, coupled with the observation that the oysters grew attached to mangroves or similar plants, shows that this was a deposit accumulated at the head of a bay or in an estuary. From the clean condition in which this material reached us, it seems likely that this collection was the result of the screening of the discharge from a suction dredge. This would also account for the absence of all small specimens from the collection. The species present indicate shallow, probably brackish, water conditions. The most notable species is the oyster (evidently growing attached to plants) and the great number of *Congerina* shells. The oyster shells are often seen to be covered with barnacles. Besides the one species of barnacle, there were three species of Gastropods and five species of Pelecypods. One of the Gastropods, *Neritina virginea* Lam., has the color pattern of the shell beautifully preserved. This deposit is probably more recent than that at Mount Hope, but is probably, like it, Pleistocene.

We are indebted to Mr. J. B. Henderson, of Washington, for working over and determining a large part of the species listed below.

LIST OF SPECIES FROM THE OYSTER-SHELL LAYERS FROM THE
BLACK SWAMP NEAR MOUNT HOPE.—COLLECTION 1.

- Balanus eburneus* Gould.
Tornatina canaliculata (Say). R.³
Cylichnella bidentata (Orb.).
Atys sandersoni Dall.
Bullaria occidentalis (A. Ad.). C.
Haminea canalis Dall.
Haminea antillarum (Orb.). R.
Terebra spei n. sp.
Conus proteus Hwass. R.
Drillia leucocyma Dall.
Drillia ostrearum Stearns.
Drillia harfordiana (Reeve), var. *colonensis* n. v. R.
Clathurella jewettii Stearns. R.
Cythara balteata (Reeve).
Cythara biconica (C. B. Ad.). C.
Marinula colonia Dall. R.
Olivella myrmecoon Dall. C.

³ The abundance or rarity of the species is indicated by the letters R. (rare) and C. (common).

- Marginella cincta* Kien. C.
Marginella pallida (L.). R.
Marginella minuta Pfr.
Voluta alfaroi Dall. R.
Fasciolaria sp. R. Specimen too young to determine.
Latirus cingulifera (Lam.). R.
Phos intricatus Dall. R.
Engina turbinella (Kien.). R.
Nassa vibex Say.
Columbella mercatoria (L.).
Anachis avara (Say). R.
Anachis samanensis Dall. C.
Anachis pulchella (Kien.). R.
Aspella scalaroides (Blainv.). R.
Strombus bituberculatus Lam.
Strombus pugilis L.
Trivia pediculus (L.). R.
Murex rufus Lam. R.
Murex pomum Gmel.
Murex nodatus Reeve. C.
Urosalpinx sp. R.
Eulima bifasciata (Orb.). R.
Cymatium vespacium (Lam.). R.
Cymatium tuberosum (Lam.). R.
Cerithiopsis sp. R.
Bittium varium Pfr. C.
Cerithium literatum (Born.). R.
Cerithium algicola C. B. Ad. C.
Cerithium medium Dall. R.
Cerithium variabile C. B. Ad.
Cerithidea varicosa Sby. R.
Modulus modulus (L.). C.
Modulus catenulatus Phil. R.
Littorina angulifera Lam. R.
Vermetus nigricans Phil.(?). R.
Alabina cerithioides Dall.
Alaba tervaricosa Ad. R.
Rissoina lævigata C. B. Ad. var. *browniana* Orb.
Rissoina striatocostata Orb. R.
Rissoina cancellata Phil. R.
Rissoina elegantissima Orb. R.
Crepidula convexa Say. C.
Crepidula plana Say. R.
Calyptrea candeana Orb. C.
Natica pusilla Say. R.
Sigaretus perspectivus Say. R.
Phasianella pulchella C. B. Ad. C.
Turbo crenulatus Gmel. R.
Astrarium brevispina (Lam.). R.
Astrarium tuberosum (Phil.) (?).

- Tegula fasciata* (Born.).
Fissuridea alternata (Say).
Submarginula emarginata (Blainv.).
Submarginula rollandii (Fischer).
Acmæa punctulata (Gmel.).
Neritina viridis Lam. C.
Tonica schrammi Shuttl. R.
Dentalium callithrix Dall. C.
Cadulus vauhani Dall. C.
Leda vulgaris n. sp. C.
Leda acuta Conr. R.
Yoldia perprotracta Dall. C.
Arca umbonata Lam. R.
Arca imbricata Brug. R.
Arca antiquata L. C.
Arca deshayesi Hanley. C.
Arca campechiensis Dillw. R.
Arca adamsi Smith.
Arca occidentalis Phil. R.
Arca reticulata Gmel. R.
Scapharca pittieri Dall. C.
Byssarca fusca Brug. C.
Melina ephippium (L.). C.
Ostrea virginica Gmel. C.
Pecten ziczac (L.). C.
Pecten exasperatus Sowb. C.
Pecten gibbus (L.).
Pecten gibbus dislocatus Say. R.
Mytilus exustus Lam. R.
Chama sp. R.
Chama sp. C.
Crassinella guadalupensis (Orb.). R.
Diplodonta mediamericana n. sp. R.
Diplodonta soror C. B. Ad. C.
Codakia orbiculata (Mont.). R.
Codakia antillarum Reeve. R.
Lucina chrysostoma Phil. C.
Phacoides lintea (Conr.). R.
Phacoides near crenulatus (Conr.). R.
Phacoides antillarum Reeve. R.
Phacoides leucocyma Dall. R.
Phacoides pectinatus (Gmel.). C.
Phacoides sp.
Cuspidaria (Cardiomya) costellata Desh. R.
Cardium serratum L. C.
Cardium medium L.
Cardium muricatum L. C.
Gafrarium (Gouldia) cerina (C. B. Ad.). R.
Pitar subarresta Dall.

Chione cancellata (L.). C.
Tellina (*Eurytellina*) *alternata* Say. C.
Tellina (*Cyclotellina*) *fausta* Don.
Tellina (*Angulus*) *versicolor* Coz.
Tellina (*Angulus*) *promera* Dall.
Abra æqualis (Say). R.
Corbula equivalvis Phil. C.
Corbula swiftiana C. B. Ad. C.
Manicina areolata (L.).
Porites porites (Pallas).
Agaricia agaricites (L.).
Cladocora orbicula (Le Sueur).
Siderastrea sidera (Ell. and Sal.).
Favia fragum (Pallas).

LIST OF SPECIES OBTAINED FROM THE BLACK MUD UNCONFORMABLE
 ON THE GATUN FORMATION AT THE LOWER END OF THE
 GATUN LOCKS.—COLLECTION 2.

Balanus eburneus Gould.
Melongena melongena (L.).
Cerithidea varicosa Sby.
Neritina virginea Lam. C.
Ostrea virginica Gmel. C.
Congeria (*Mytilopsis*) *cochleata* Kick. C.
Phacoides pectinatus (Gmel.). C.
Anomalocardia cuneimeris Con. R.
Cyrena (*Polymesoda*) *acuta* Prime. R.

DESCRIPTIONS OF NEW SPECIES.

Terebra spei n. sp. Fig. 1.

The shell is small, slender, the diameter contained five times in the length. Apex lost, $11\frac{1}{2}$ whorls remaining are slightly convex. Sculpture consists of rather sharp axial ribs, narrower than their concave intervals, curving backward in the middle, on the last whorl 22 in number, and continued as far as the anterior contraction; a spiral groove, equally deep over ribs and intervals, defines a posterior fasciole which is somewhat less than one-third the width of each whorl; below this there are seven spiral cords wider than their interstices, prominent in the concave inter-

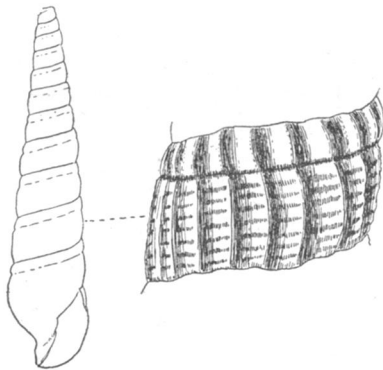


Fig. 1.—*Terebra spei* n. sp.

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costal spaces, but almost effaced where they pass over the crests of the axial ribs. The aperture is trapezoidal; columella not plicate, but its lower edge is slightly prominent.

Length 15, diam. 3.25, length of aperture 3.3 mm.

Mount Hope bed.

While related to *T. protexta*, this species differs by the convexity of the whorls.

***Drillia harfordiana* var. *colonensis* n. var.**

The shell resembles *Pleurotoma harfordiana* Rve. in form, but is very much smaller. The anal fasciole is rather wide, concave, with a single prominent spiral cord near the suture. Below the fasciole there are rounded, slightly protractive axial ribs, strongest at the shoulder, rapidly diminishing downwards, and ten in number on the penultimate whorl. They are crossed by rather widely spaced spiral cords, of which three are visible on the penultimate, about a dozen on the last whorl. The cords are equally developed on the ribs and in their intervals, and the spaces between them are occupied by very fine spiral striæ, especially well developed on the fasciole. The coloration, though faded, is visible on some specimens. There is a white band at the shoulder and several white lines below, on a tawny ground. Length 12, diam. 5.5 mm.; about 9 whorls.

Mount Hope bed.

An allied recent form from Nicaragua is described below.

***Drillia harfordiana* var. *flucki* n. v.**

Similar to var. *colonensis* except in the following details. The axial ribs are much more numerous, seventeen on the penultimate whorl; on the last whorl they diminish very rapidly below the periphery, and the spiral cords are noticeably enlarged and prominent on the summits of the ribs; the 6th and 7th below the shoulder are white. From the shoulder to the suture the surface is buff-white, and the growth striæ somewhat lamellar; elsewhere the shell is dark mineral-red (of Ridgway's Color Standards).

Length 19.3, diam. 8, length of aperture 8.2 mm.; 10 whorls, the tip wanting.

King's Keys, Nicaragua, recent. Rev. W. H. Fluck.

The figure of *D. harfordiana* Rve. measures, length 27.5, diam. 12.5 mm. The habitat of the species was and still is unknown, and it has not been described with sufficient detail; but these Central American forms resemble it in general features and may well be local forms of the same species.

Diplodonta mediamericana n. sp. Fig. 2.

The shell is of the usual orbicular shape, the length and altitude about equal, diameter nearly two-thirds of the length; rather thin; surface densely and very delicately striate, smoother towards the beaks, which are somewhat prominent. Margins somewhat straightened on both sides of the beaks; the anterior end a little more broadly rounded than the posterior. Teeth rather strong. Length 15.5, alt. 15.1, diam. 9.8 mm.

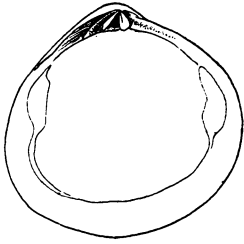


Fig. 2.—*Diplodonta mediamericana* n. sp.

Porto Barrios and Livingston, Guatemala, in mud brought up on an anchor, S. L. Schumo, cotypes No. 76,479 A. N. S. P. Also Mt. Hope, Professor W. B. Scott.

This species closely resembles *D. puncturella* Dall, but differs in the sculpture and proportions. *D. nucleiformis* (Wagner) is a much smaller and more obese form.

Leda vulgaris n. sp. Fig. 3.

The shell is rather solid, plump, equivalve; beaks median, small, contiguous. Anterior end rounded, its upper margin convex. Posterior end rapidly tapering, attenuate, its upper margin concave. Surface glossy, with fine, regular sculpture of concentric grooves as wide as the intervening ridges. The posterior dorsal surface is flattened, striate, bounded by strong ridges, giving the appearance of a large, lanceolate escutcheon. There are 16 anterior and about 26 posterior teeth.

Length 12, alt. 6.3, diam. 5.2 mm.

Length 11.5, alt. 6.3, diam. 6 mm.

This species, which is extremely abundant in the Mount Hope Formation, was also obtained in mud from an anchor collected by Mr. S. L. Schumo at Porto Barrios, Livingston, Belize, and Monkey River, and is therefore a common form of the Central American litoral. *L. commutata* Phil., which seems closely related, is a wider species, the basal margin being more deeply arcuate. *L. mauritiana* Sowerby is very similar, but in various details is nearer to *L. jamaicensis* Orb.

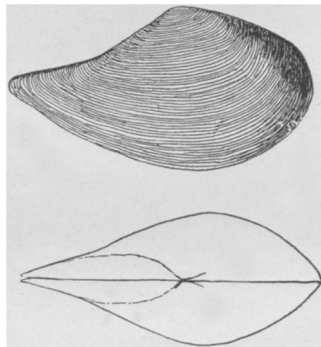


Fig. 3.—*Leda vulgaris* n. sp.

Leda vulgaris var. **obliterata** n. v.

A form closely related to *L. vulgaris* was collected by Mr. Clarence B. Moore in Indian Pass, Appalachicola Bay, Calhoun Co., Fla. It differs by having the valve smooth until it reaches an altitude of about 4 mm., after which it is concentrically grooved as in *vulgaris*. There are about 16 teeth before, 18 behind the beaks.

Length 10.7, alt. 6, semidiameter 2.2 mm.

Seventeen detached valves but no complete shells were taken. Cotypes No. 109,049 A. N. S. P.